Alternative II: Limit Further Land-Based Modernization

Today's silo-based ICBM force is widely considered vulnerable to a Soviet attack. Administration plans for shoring up the land-based leg of the triad include deploying about 500 single-warhead small missiles (SICBMs) in mobile launchers hardened to some degree to withstand nuclear effects, and deploying another 50 of the 10-warhead MX missiles on rail cars. In peacetime, both systems would be situated on military bases in basically fixed sites. This arrangement holds down costs and increases security but also makes the missiles vulnerable to Soviet attack. SICBM is designed to disperse sufficiently for high levels of survivability within the 30 or so minutes of notice that a Soviet attack was actually under way. On the other hand, Rail MX would require about six hours of advance--or strategic--warning to disperse sufficiently to achieve that same initial level of survivability. (Warning from U.S. space-based and ground-based sensors that a Soviet attack was actually under way is known as tactical warning. Strategic warning, on the other hand, can consist of any number of intelligence indicators that the likelihood of an attack is increased-such as communications intelligence indicating much increased activity in some Soviet forces.) The high cost of building two new mobile systems--about \$57 billion to build and operate the two systems for 15 years--has led the Congress to consider choosing one or the other of the programs.

Effects on the Administration's Modernization Goals. Choosing one of the two systems could still contribute toward the goal of a triad with independently survivable legs, but it would offer fewer warheads than planned by the Administration. Nevertheless, choosing only one system would still provide prompt hard-target retaliatory capability in the land as well as the sea-based legs of the triad, providing a hedge against technical difficulties with the sea-based force.

The degree of reduction in warheads depends on assumptions about the survivability of the systems. If they were expected to be dispersed early in a crisis, the Soviets would be unlikely to attack because doing so would use too many of their warheads. Under these assumptions, either program would provide about 500 warheads, half of the Administration's plan. (About 90 percent would be available for retaliation, since 10 percent is assumed to support a maintenance pipeline.) All of these warheads would be capable of prompt hard-

target retaliation. If dispersed only once a Soviet attack was under way, then MX would provide only a few surviving warheads. SICBM's additional speed, hardness, and ability to disperse randomly could still allow it to provide a substantial number of surviving warheads even under this assumption.

Savings. Savings under this option would depend on the choice between systems. Canceling SICBM and keeping Rail MX would save the most-about \$18 billion over the next five years and an eventual total of \$37.4 billion. Savings in 1988 would total \$2.2 billion. Canceling MX, and keeping SICBM, would save only a total of \$8.4 billion, with almost all the savings coming in the next five years. Savings in 1988 would total \$0.6 billion. Operating costs would also decline. Again, canceling SICBM saves the most in operation and support (\$580 million a year after full operations would have been achieved), with less savings if the MX is canceled (\$240 million a year).

Which System to Cancel. As these costs imply, Rail MX is clearly much cheaper than SICBM. SICBM, however, would be more cost-effective--in terms of surviving warheads--in the event of a surprise attack where the systems were dispersed only on tactical warning.

How important is the capability to survive with only tactical warning? The United States invests heavily in operations and support of its bomber and submarine forces to assure some independence from strategic warning in each of these triad legs. While a "bolt-out-of-the-blue" Soviet attack is considered highly unlikely, history has many examples where strategic warning indicators were not acted upon, with the end result being similar to a surprise attack. Drawing conclusions about the appropriate warning sensitivity for the ICBM force from this picture is difficult. On the one hand, achieving some level of independence from strategic warning is obviously considered important and worth substantial cost. SICBM offers this independence. On the other hand, two legs of the triad have already reached this level of independence, and the requirement for the ICBM force to also have this ability may be limited.

Rail MX would be highly survivable once dispersed. However, dispersal of MX on strategic warning requires dispersal onto the public rail network, which could cause problems. Air Force officials do not consider it likely that such dispersal will interfere with the opera-

tions of the rail lines, since the number of trains carrying the MX will be such a small fraction of the total activity on the rail, and since they will only be moving periodically. However, depending on the situation, the decision to disperse might be difficult--for instance, if an Administration did not want to alarm or involve the public at a particular time.

SICBM also fulfills an Air Force requirement for single-warhead ICBMs, which is currently filled only by older Minuteman II missiles in vulnerable silos. Moreover, SICBM's launcher vehicle, which is hardened against nuclear effects and able to travel off-road, makes it more likely to survive during an extended conflict.

In summary, although the SICBM can provide advantages over the MX, they come at a significant cost. That is why choosing between the two systems would not be easy.

Alternative III: Cancel Manned Penetrating Bomber

The Congress may decide that it does not wish to limit modernization of the most vulnerable leg of the triad but must still hold down costs. If so, it could maintain a triad that could survive a Soviet attack, while forgoing the advantages of a manned penetrating bomber that is better able to penetrate future Soviet air defenses. Specifically, under this option, it would cancel procurement of the Advanced Technology Bomber (ATB) which is designed to be nearly invisible to Soviet radars. This alternative would continue to rely instead on the B-52s carrying cruise missiles and the B-1B bombers carrying both cruise missiles and short-range weapons. Because it would keep the B-52Gs longer than planned, this option would require additional procurement of about 1,200 advanced cruise missiles to fully arm the force plus modifications to keep old B-52 bombers operating at reasonable efficiency.

Effects on the Administration's Modernization Goals. This option would preserve a triad of survivable forces. With the B-1B, it would also preserve some ability to penetrate the Soviet Union with a manned bomber, although this ability would be much more limited than under the Administration's plans. Thus, the United States would be less able to detect and destroy mobile targets, such as mobile

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missiles and mobile command and control systems, the number of which is expected to increase significantly. Proponents of manned penetrating bombers believe they are needed to ensure that a significant portion of these Soviet targets are put at risk in the event of Soviet aggression.

On the other hand, mobile systems are generally thought to enhance stability and deterrence, since they can survive an attack and assure retaliatory capability. Thus, opponents of the bomber believe that one of its major missions contradicts U.S. efforts to encourage both sides to deploy more survivable weapons systems. Moreover, it is hard to know how effective a manned bomber would be in search-and-destroy efforts occurring after a nuclear attack. If it is thought likely to work, the bomber could increase pressure for another round of the arms race as the Soviets try to protect their mobile systems or develop systems to attack U.S. mobile weapons. Finally, other missions for a manned bomber, such as damage assessment, could possibly be accomplished by alternate means--satellites or high-flying reconnaissance aircraft, for example, although their ability to operate in a nuclear environment is questionable.

Savings. Though savings are likely to be large under this option, they cannot be accurately assessed. The ATB is a highly classified program; only the most aggregate data about costs and effects are publicly available. Nonetheless, based on press reports of DoD statements, the total ATB program will cost \$57 billion, most of which probably remains to be spent. Although there would be other changes in costs under this option, including some increases to buy more cruise missiles and to keep B-52G bombers operating, total savings could well exceed \$40 billion.

Alternative IV: Delay Further Modernization

If it does not wish to terminate any programs, the Congress could still reduce the cost of strategic forces by delaying procurements. This option, for example, would delay four major programs--the ATB, SICBM, Rail MX, and SRAM II--by three years, maintaining funding for research at 1987 levels to preserve the option of later procurement. Senator Sam Nunn, Chairman of the Senate Committee on Armed

Services has recommended this general approach of delaying new systems, though not the specifics of this option.

Effects on the Administration's Modernization Goals. This option would delay modernization of the triad. The major systems affected would probably not begin to be deployed until the mid-1990s; under current plans, they would be largely deployed by this time. Warhead counts in Summary Table 2 reflect a modest decrease as a result of this delay. Beyond the year 2000, the effects of this option would rapidly disappear as the delayed systems were fully deployed.

Savings. This option would reduce investment costs by \$17.9 billion over the next five years, with savings of \$1.7 billion in 1988 and \$2.4 billion in 1989. The amounts do not include savings from the ATB, which should add substantially to these totals. The option's effects on long-run costs are uncertain but could be higher. Keeping development teams together for longer would probably increase costs. On the other hand, some costly problems with recent systems (like the B-1B) have been attributed to overlapping development and production, which this alternative would reduce. Long-run operating costs should not change much.

CHAPTER I

INTRODUCTION

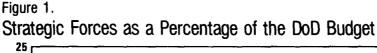
While the triad of strategic forces has been continually upgraded with new and more capable components since it was established in the 1960s, no new aircraft or land-based missiles have been procured for over 15 years. One of the highest priorities of the Reagan Administration's defense program has been to modernize and upgrade strategic forces and their associated command and control elements. This modernization has included procuring major weapons systems in each leg of the nuclear triad: land-based missiles, submarine-based missiles, and bombers.

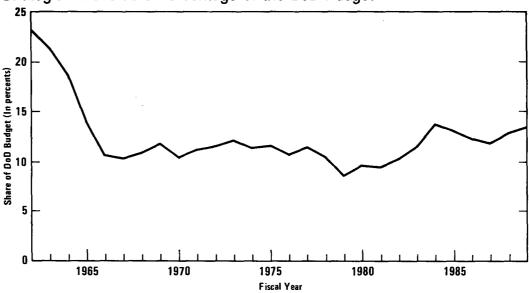
Recent budgets reflect the priority accorded strategic forces. Between 1980 and 1985, while the overall defense budget increased by an average of 9 percent a year, funds allocated for strategic forces grew by 15 percent annually. The strategic forces budget declined 7 percent in 1986 and less than 1 percent in 1987. But these two years represented an interim period between the end of major procurement for the B-1B bomber program and the beginning of major procurement for later systems like the Advanced Technology Bomber (ATB). On average, during the 1980-1987 period, the United States spent about \$32 billion a year on strategic forces.

This growth affected the share of total spending devoted to strategic forces. That share rose from 9.7 percent in 1980 to 13.1 percent in 1985, and then declined to 11.9 percent in 1987. These levels differ little from the historical average: from the mid-to-late 1960s through the mid-to-late 1970s, the share of the budget for strategic forces ranged between 10 percent and 12 percent (see Figure 1). During the early-to-mid 1960s, when the United States substantially expanded its strategic forces, and also maintained very large air defense forces, the share of the budget was about 15 percent to 20 percent, and even exceeded 20 percent early in that period. (No data are available for the years before 1962.) The historical low for the strategic forces' share of the budget--8.7 percent--occurred in 1979.

Information from the Department of Defense (DoD) for 1987 through 1989 shows that, in keeping with Administration priorities, the President's budget request for strategic forces will grow more rapidly than the total defense budget request, perhaps pushing strategic funding above historical averages. Table 1 shows that the budget for strategic forces would grow in real terms by about 10 percent from 1987 to 1988 and by about 7 percent from 1988 to 1989. Under Administration plans and economic assumptions, the total DoD budget would grow by about 3 percent a year in real terms through 1992; thus the strategic share of that budget for strategic forces will increase from 11.9 percent in 1987 to 13.4 percent in 1989 (see Table 1).

Though projections are not publicly available, this trend toward higher growth could well continue over the five-year period from 1988 through 1992. Several major modernization programs--such as the small intercontinental ballistic missile and the Advanced Technology





SOURCE: Congressional Budget Office based on data from the Department of Defense for 1962-1987.

Data for fiscal years 1988 and 1989 are based on the President's budget request.

NOTE: Data reflect total obligational authority.

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Bomber--are moving from the relatively less expensive stage of research into procurement. Higher growth also reflects increases in research on the Strategic Defense Initiative, which almost doubles in this period under Administration plans. The Secretary of Defense has stated in recent testimony, however, that the total budget for strategic forces would not exceed 15 percent of the total DoD budget for any year.

Despite planned growth in strategic costs, the Congress has indicated that it is not likely to provide the overall defense growth the Administration would like over the next three years and that it may continue reducing the defense budget. Depending on the level of tax increases, the budget resolution approved by the Congress would

TABLE 1. BUDGET FOR STRATEGIC FORCES (In billions of 1988 dollars)

	1987	1988	1989
DoD Total Obligational Authority (TOA) a/	298.1	304.1	313.1
Strategic forces (Investment) <u>b</u> / Real growth (in percents)	35.6 (24.9) n.a.	39.2 (29.1) 10.1	42.1 (31.8) 7.4
Strategic share of TOA (in percents)	11.9	12.9	13.4

SOURCE: Congressional Budget Office based on Department of Defense data.

NOTE: n.a. = not applicable.

Amounts are taken from Department of Defense, Five-Year Defense Plan. Includes supplemental appropriation in 1987. The budget for strategic forces includes funds for both offensive strategic forces and defensive strategic forces.

- a. Total obligational authority (TOA) is a DoD financial term that measures the value of the direct defense program for a fiscal year. Net offsetting and trust fund receipts are not deducted from TOA as they are from budget authority (BA). They are collections from the public that arise out of the business-type or market-oriented activities of the government and are deposited in receipt accounts. In recent times, the differences between TOA and BA have been small.
- b. Investment includes Procurement; Research, Development, Test and Evaluation; and Military Construction.

provide an average of between 1.0 percent and 2.4 percent real decline in the defense budget over the next three years. As a result of the juxtaposition of declining defense budgets and sharply increasing spending requirements for the strategic modernization program, the Congress will face some difficult choices in the years ahead. This study addresses those choices for strategic offensive forces.

ISSUES FACING U.S. STRATEGIC FORCES

The United States maintains three basic types of strategic offensive forces. This triad includes:

- o Land-based intercontinental ballistic missiles (ICBMs);
- o Submarines (SSBNs) armed with sea-launched ballistic missiles (SLBMs); and
- o Strategic bombers and bomber-carried weapons, such as gravity bombs, short-range attack missiles (SRAMs), and air-launched cruise missiles (ALCMs).

Land-based missiles include the older Minuteman II and Minuteman III missiles, the MX (or Peacekeeper) missile currently being deployed, and a plan for a new, small intercontinental ballistic missile (SICBM). Sea-based forces include Poseidon submarines carrying Poseidon (C-3) and newer Trident I (C-4) missiles, and new Trident submarines currently carrying C-4 missiles but eventually planned to carry new Trident II (D-5) missiles. Strategic bomber forces include older B-52 bombers, which comprise the bulk of the force, a relatively small number of FB-111s, B-1B bombers currently being fielded, and a plan for an Advanced Technology ("Stealth") Bomber, also known as the B-2. Cruise missiles can be ground-, sea-, or air-based. Only air-launched cruise missiles carried by strategic bombers, however, are unambiguously considered strategic weapons. Appendix A describes the major types of U.S. forces included in each category.

Together, all of these forces provide the United States with roughly 12,000 strategic warheads today, up from about 9,000 in 1981.1/ Warheads for which funds have already been provided, but

^{1.} These amounts include total inventories of ballistic missile warheads and bomber-carried weapons. Amounts in the Summary excluded weapons in the overhaul and maintenance pipeline.

that have not yet entered the inventory, will raise the number to over 14,000. Administration plans for additional increases in strategic spending will probably not add further to warhead levels, since older systems will be retiring, but will provide improvements in other measures of capability that are discussed more fully below.

COMPARISON OF CURRENT FORCE LEVELS OF THE UNITED STATES AND SOVIET UNION

As background for assessing the Administration's plans, it is useful to understand the current balance of strategic forces between the United States and its principal nuclear adversary, the Soviet Union, and how that balance has been affected by recent trends in modernization.

U.S. and Soviet Warhead Counts and Modernization

As Table 2 shows, the United States and the Soviet Union currently have similar numbers of total warheads, with the United States slightly ahead. The balance has not been static, however, even with arms limitations. Since 1981, the United States and the USSR have each added several thousand warheads to their strategic nuclear arsenals.

Moreover, both sides have modernized their forces. Between the late 1960s and early 1980s, the United States deployed relatively few new submarines, bombers, or land-based missiles that deliver nuclear weapons. But the United States did refit many existing systems with multiple warheads, thereby substantially increasing the number of its warheads. The United States also improved factors such as the range and accuracy of weapons. (The specifics of the recent U.S. modernization program are discussed more fully in Chapter III as background for current Administration plans.)

As part of its modernization, the Soviet Union has introduced many more new weapons systems than has the United States. Since the early 1960s, the Soviets have been building up their strategic

UNITED STATES AND SOVIET STRATEGIC FORCES IN 1987 TABLE 2.

		Warheads per	Total	
System	Launchers	Launcher	Warheads	
	United	States		
ICBMs	470		450	
Minuteman II	450	1	450	
Minuteman III	523	3	1,569	
MX	<u>27</u>	10	-270	
Subtotal	1,000		2,289	
SLBMs				
Poseidon (C-3)	256	10	2,560	
Poseidon (C-4)	192	8	1,536	
Trident (C-4)	192	8	1,536	
Subtotal	640	-	5,632	
Bombers	0.13		3,33-	
B-52G	69	8	552	
B-52G (With cruise missiles)	98	12	1,568	
B-52H	49	10	490	
B-52H (With cruise missiles)	49	12	784	
B-1B	64	16	1,024	
Subtotal	329		4,418 a/	
TOTAL	1,969		12,339	
	Soviet	Union		
ICBMs	4.40	•	440	
SS-11	440	1	440	
SS-13	60	1	60	
SS-17	150	4	600	
SS-18	308	10	3,080	
SS-19	360	6	2,160	
SS-X-25	<u>100</u>	1	100	
Subtotal	1,418		6,440	
SLBMs				
SS-N-6	272	1	272	
SS-N-8	292	1	292	
SS-N-18	224	3	672	
SS-N-20	80	6-9	720	
SS-N-23	<u>64</u>	10	_640	
Subtotal	932		2,596	
Bombers				
Bear	100	4	400	
Bear H	50	8	400	
Bison	<u>15</u>	4	<u>60</u>	
Subtotal	165		860	
TOTAL	$\frac{100}{2,515}$		9,896	

SOURCE: Congressional Budget Office estimates.

NOTE: Reflects total inventories. Does not include U.S. FB-111 and Soviet Backfire bombers.

a. Notional weapons carriage parameters, based on estimates of total inventories of bomber weapons. May slightly overstate inventories.

offensive and defensive forces, both in terms of quantity and capability per weapon. The centerpiece of their efforts has been their ICBM force. During the 1970s, for example, the Soviets developed and deployed three new ICBMs capable of carrying multiple warheads-including an ICBM with the most throwweight of any deployed missile, the SS-18. This trend is continuing in the 1980s, including the deployment of mobile missiles. Today, over 60 percent of Soviet warheads are concentrated in their ICBM force.

Most of the current Soviet submarine force is equipped with single-warhead missiles, and the Soviet strategic bomber force has not had the prominence of its U.S. counterpart. The Soviets, however, are continuing with modernization programs in the 1980s that will substantially expand their sea- and air-based forces.

Other U.S. and Soviet Pre-Attack Measures of Force Capability

As Figure 2 illustrates, the two superpowers possess a roughly even number of total warheads and a roughly even number of warheads capable of destroying hardened targets. 2/ (Appendix B discusses the measures and scenarios used in this analysis.) Unlike the United States, however, the Soviet Union has almost all its hard-target warheads on ICBMs. Ballistic missiles can be delivered to their targets within minutes while bombers take many hours. Although the intelligence community has recently reassessed its estimates of the accuracy of some Soviet ICBMs, their capability is still theoretically more than enough to destroy virtually all U.S. land-based missile silos.3/ Moreover, the Soviets may have an incentive to use

^{2.} Figure 2 compares on-line weapons while Table 2 compares weapons inventories. On-line weapons are operational weapons not undergoing maintenance and repair; these weapons would be available to military planners in the event of nuclear war. All silo-based ICBMs are considered to be on-line. About 10 percent of the U.S. bomber force is in the "maintenance pipeline" at any time, and U.S. submarine overhauls and repairs are generally predictable and scheduled. This analysis assumes that about 20 percent of Soviet submarines are undergoing repair and overhaul at any time since a planned schedule cannot be constructed.

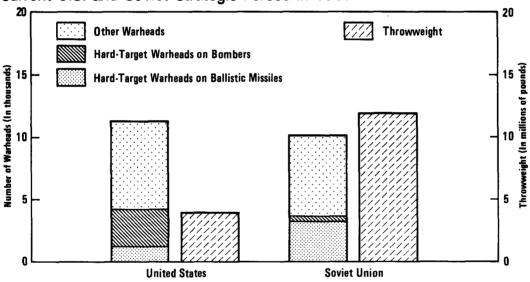
^{3.} Whereas most of the multiple-warhead ICBMs deployed in the 1970s were considered capable of destroying hardened targets, the SS-18 and perhaps the new SS-25 are currently the only ICBMs considered to have significant capability against hardened targets. Compare Soviet Military Power, 1984, p. 23, and Soviet Military Power, 1987, p. 29. See also National Journal, July 20, 1985, p. 1692.

their ICBM warheads first in a crisis, since over 98 percent are currently based in fixed silos that could be vulnerable to a preemptive U.S. attack.

Compared with the United States, the Soviet Union has about three times as much throwweight, or payload capacity, in its land-based and sea-based ballistic missiles. Most Soviet throwweight is concentrated in its large and most accurate land-based missiles--the SS-18s. The Soviet lead in throwweight has raised concerns that they could surreptitiously increase the numbers or yields of warheads on these missiles. In the context of strategic defenses, it has also raised concerns about the leverage for deploying penetration aids and warhead decoys without having to make a trade-off in numbers of warheads deployed.

Figure 2.

Current U.S. and Soviet Strategic Forces in 1987



SOURCE: Congressional Budget Office estimates.

NOTE: Adjusted for on-line weapons.

Post-Attack Balance of Forces

A major objective of strategic force modernization efforts is to improve the survival prospects of current and future forces. Post-strike inventories not only measure expectations as to the survivability of U.S. forces, but also incorporate the capabilities of the attacking Soviet forces.

Figure 3 shows U.S. warheads surviving a Soviet nuclear attack that occurred after a period of marked tension or conventional hostilities during which time the nuclear forces of both sides would be brought to a war footing. This attack is described as one with strategic warning and is widely considered the most plausible scenario.4/ With very few surviving hard-target warheads on ballistic missiles, the United States would not be able to retaliate quickly in kind against remaining Soviet silo-based missiles. The U.S. bomber force would have about 2,600 surviving hard-target weapons, but the Soviets would have many hours to try either to coerce the United States into recalling them (by threatening further prompt attack) or to launch another attack before the bombers arrived. The other 5,600 surviving U.S. warheads would not have substantial capability against hardened targets.

Thus, in 1987, deterrence relies heavily on the fact that the Soviet Union unquestionably can be devastated by a U.S. retaliatory strike against targets less hardened against nuclear attack, and on the potential that the United States could launch its approximately 1,200 hard-target ICBM warheads before absorbing a Soviet attack, particularly in the scenario described above where a potential attack was anticipated.

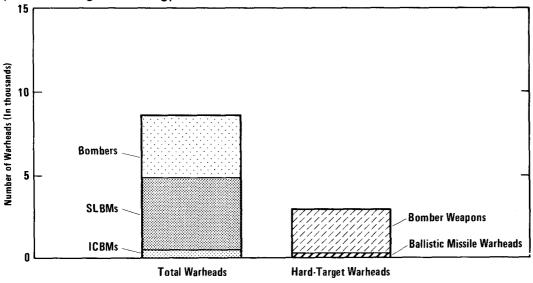
^{4.} Strategic warning is evidence indicating the probability of an attack, or its preparation. It can range from an intelligence officer's assessment of activities of the leadership to photointelligence indicating a higher level of readiness or deployment of forces. Naturally, if the aim was truly to go to war, rather than use tactics for intimidation, the aggressor would attempt to mask the real nature of his activities.

PERSPECTIVES ON U.S. DETERRENCE STRATEGY AND ITS REQUIREMENTS

The primary mission of U.S. strategic forces is to deter the Soviet Union from initiating a nuclear war or from using its forces to coerce the United States or its allies into political decisions. Failing that, the mission of these forces is to impose unacceptable costs at the lowest possible level of escalation, forcing the Soviets to decide that halting their aggression is the best outcome.

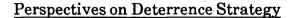
Notions of how best to achieve deterrence have evolved in ways that have altered requirements for some types of nuclear weapons. The following sections describe the background for those changes and how they have influenced nuclear force requirements. Not everyone agrees with these changes, and one's choice of a strategy for deterrence influences decisions about how best to proceed with strategic modernization.

Figure 3.
U.S. Warheads Surviving a Soviet Attack in 1987 (With strategic warning)



SOURCE: Congressional Budget Office estimates.

NOTE: Adjusted for weapons available for retaliation.



Contrary to widely held perceptions, U.S. nuclear war plans supporting deterrent strategies have always included a wide range of types of targets. Furthermore, the general categories of targets have remained remarkably consistent: military forces, stockpiles, bases and installations; economic and industrial centers; and the Soviet nuclear forces and leadership. 5/ The military objectives underlying nuclear targeting have also been consistent—to deny the Soviets the will or the ability to wage war effectively.

The priorities and emphases assigned to these categories of targets, however, have varied. In part, they have varied with developments in U.S. capabilities: greater supplies and types of weapons; improved intelligence for detection and identification of targets; and improved accuracies. In part, they have varied in reaction to Soviet efforts in both their conventional and nuclear forces and as a result of efforts to identify what would best deter them.

Although the specter of any use of nuclear weapons resulting in a massive, uncontrolled exchange of nuclear weapons between the United States and the Soviet Union remains the bedrock of deterrence and circumspection in the nuclear age, mutual suicide would most likely be the result of miscalculation rather than planning. United States nuclear forces are relied on to deter both a nuclear attack on the United States and a conventional attack on its allies. The latter poses the greater challenge.

Soviet interests, insofar as expanding territory and control are concerned, are much more likely to center on lands other than the United States--such as Western Europe, the Middle East, or Southwest Asia--posing a direct or indirect threat to the Alliance. On the basis of both U.S. deterrence policy and potential Soviet expansionist aims, the breakout of conventional hostilities in these areas is considered the most conceivable route to the use of nuclear weapons, and thus the most challenging for deterrence.

^{5.} Desmond Ball, Targeting for Strategic Deterrence, Adelphi Paper No. 185, IISS, 1983, p. 4.